HOT GAS APPLICATION OF METHYL BROMIDE AND METHYL IODIDE FOR SOIL FUMIGATION FIELD TRIALS

J. 0. Becker[1]*, H. D. Ohr[2], M.E. McGiffen, Jr.[3], and J.J. Sims[2]
Departments of [1]Nematology, [2]Plant; Pathology and [3]Botany & Plant Sciences, University of California, Riverside, CA 92521

Field experiments with soil fumigants pose a challenge to researchers. The inherent danger of these broad spectrum biocides make safety considerations a top priority. Large scale field trials need to be arranged with a commercial applicator. Their willingness to cooperate in scientific experiments often collide with their tight schedule and demands for commercial fumigation. Precision and uniformity of soil fumigant application is dependent on the sophistication of the equipment and the experience of the applicator. These factors are especially important if experimental compounds differ in their Physical Properties from standard fumigants such as methyl bromide (MBr) or 1,3-D. An additional complication is the difficulty to find suitable test sites for research with plant parasitic nematodes. Standard requirements for a good experimental site include fairly, uniform chemical, physical and biological soil properties as well as a moderate to high population of the target pest throughout the test area. Yet field sites are usually not uniformly infested but have spatial aggregations of plant parasitic nematodes. This can be partially overcome by artificially infesting small field plots on research stations. However, commercial fumigation rigs are usually too large to be used in such settings.

During the last two years we have used a miniature fumigation rig which is based on a technique developed for bed fumigation. It is commercially known under the name "hot gas fumigation and is commonly used with drip- . irrigated, plastic covered bed cultures such as melons, peppers, ornamentals and strawberries. Test fumigants were cooled to -50C and measured into a cooled gas-tight plastic bottle with screw-on disperser. It was hooked in-line with a nitrogen gas source which drove the fumigant through a coil submerged in a boiler containing hot water (>85C). The heated MBr was then blown through a drip tape or tubing sealed at the end. The fumigant was released through the 30 cm-spaced emitters of the tape/tubing. The tape/tubing were either placed on top of the beds or preferably were buried at 5-15 cm depth. The beds were, tarped before fumigation and removed after 2-4 days. We have used this method successfully with both MBr and methyl iodide, typically treating 6 to 30 m long and 0.6 to 1 m wide beds. Efficacy of the treatments was very uniform as evaluated by enumeration of surviving nematode juveniles, fungal propagules or weeds.

In summary the presented technique permitted safe fumigation experiments in small field plots and allowed precise comparisons of potential alternatives to MBr in randomized complete block trials.